Description

Method for showing a graphics object, and communication appliance

The invention relates to a method for showing a graphics object and to an appropriate communication appliance, particularly a mobile telephone or a computer.

The continually progressive development in the field of mobile telephones is leading to constant miniaturization of these mobile telephones, on the one hand, and to constantly improved graphics capabilities on these mobile telephones, on the other. This causes the users of such mobile telephones to want to use the graphics capabilities of the mobile telephones efficiently despite the limited available area on the display device.

In this regard, it is known practice to arrange graphics objects, such as symbols referring to a function or a program, on a virtual interface panel which is larger than an available display panel. By moving the display panel over the virtual interface panel, it is possible for the portion of the virtual interface panel which is shown on the display panel to be varied and to be selected by the user, so that the user can use a marker, for example, to select all the graphics objects shown on the virtual interface panel.

A drawback of this solution has been found to be that a user is only ever able to see part of the virtual interface panel. The user can therefore only guess the presence and position of the graphics objects which are currently not shown on the display panel but which are arranged on the virtual interface panel.

The invention is thus based on the object of specifying a technical disclosure which allows convenient selection of

graphics objects which are arranged on a virtual interface panel which is larger than an available display panel.

This object is achieved by the features of the independent claims. Advantageous and expedient developments can be found in the dependent claims. Developments of the apparatus claim which correspond to the dependent method claims are likewise covered by the invention.

In line with the invention, graphics objects which are arranged on a virtual interface panel which is larger than an available display panel are thus projected onto the edge of the display panel if they are situated outside of the detail shown from the virtual interface panel.

The effect achieved by this is that all the graphics objects arranged on a larger virtual interface panel can be shown on a small available display panel. In this case, preferably only the part of the virtual interface panel which the user has selected by positioning the display panel over the virtual interface panel is shown to scale on the display panel. By contrast, the graphics objects which are not arranged on the portion of the virtual interface panel which is covered by the display panel are shown merely projected onto the edge of the display panel.

Within the context of this application, graphics objects are also understood to mean symbols, symbol parts, icons, icon parts, display windows, display window parts, images, image details or texts or text elements.

The display panel is preferably formed by a display device, such as a graphics display, or part of a

display device. In particular, a display panel can be produced by a graphics window.

The virtual interface panel is preferably formed by information which is held in a memory device and which describes the positions of graphics objects relative to a reference point on the virtual interface panel. In addition to this, this information may also describe the graphics objects themselves or a scale of representation. This or other information may also determine which detail from the virtual interface panel is currently to be shown in what size of representation on the display panel. The size of representation or the scale of representation of the virtual interface panel and the graphics objects arranged thereon can be changed by the user, for example, so that the case may also arise that the representation of the virtual interface panel becomes smaller than the display panel. In this case, there is no need for graphics objects to be shown in projection.

The virtual interface panel is preferably larger than a display panel when the current length and/or width dimensions of the display panel are smaller than the current length and/or width dimensions of the virtual interface panel, the dimensions of the virtual interface panel being calculated using the scale of representation which is currently applicable in this case.

Depending on the variant embodiment, a graphics object is preferably outside of the detail shown from the virtual interface panel when it is situated entirely or partly outside of the detail shown from the virtual interface panel, or when its center is situated outside of the detail shown from the virtual interface panel.

The projection onto the edge of the display panel covers the situation, in particular, in which the graphics object is moved

entirely or partly from its actual position on the virtual interface panel in the direction of the center of the detail shown from the virtual interface panel and is shown entirely or partly in the edge region of the display panel. In this case, the edge region needs to be of wide design, in particular.

Preferably, graphics objects which are shown in projection are shown in reduced form in comparison with the scale of representation which is currently applicable for the virtual interface panel, are shown in distorted form and/or are shown as simple geometric shapes, such as lines.

The edge regions occupied by the projected graphics objects have a minimal space requirement in the case of a line representation, and the space requirement is very small even in the case of a representation using scaled semicircular projections or "half" object projections. The result is an undistorted user interface detail in the display panel which has only a minimal additional space requirement (in the extreme case it is just one pixel line of the edge region) in order to be able to provide a visual display of all the graphics objects and their spatial relationship with one another.

Preferably, the size of the representation of a projected graphics object is set on the basis of the distance between the detail shown from the virtual interface panel and the position of the graphics object. The reference point which is used to calculate the distance and which represents the detail shown is preferably formed by the center of the detail shown or of the display panel, a corner point of the detail shown or of the display panel, the point of intersection between an appropriate projection line and the edge region of the display panel, or another point in the detail shown.

The invention is described in more detail below using preferred exemplary embodiments which are explained using the figures listed below, in which:

figure 1 shows a block diagram of a mobile telephone;

figure 2 shows a first exemplary embodiment of the representation and projection of graphics objects;

figure 3 shows a second exemplary embodiment of the representation and projection of graphics objects;

figure 4 shows a third exemplary embodiment of the representation and projection of graphics objects;

figure 5 shows a fourth exemplary embodiment of the representation and projection of graphics objects;

figure 6 shows a fifth exemplary embodiment of the representation and projection of graphics objects;

figure 7 shows a sixth exemplary embodiment of the representation and projection of graphics objects;

figure 8 shows a seventh exemplary embodiment of the representation and projection of graphics objects;

figure 9 shows an eighth exemplary embodiment of the representation and projection of graphics objects.

Figure 1 shows a mobile telephone MS which contains an operator control device MMI, a radio-frequency device HF and a processor device PE. The operator control device MMI comprises a display device ANZE, such as a graphics display, and operating elements, such as keys or softkeys.

To control the mobile telephone MS, the operator control unit MMI of the mobile telephone MS and the methods which are performed by the mobile telephone, a program-controlled processor device PE, such as a microcontroller, is provided which may also comprise a processor CPU and a memory device SPE.

Depending on the variant embodiment, this may involve further components - which are associated with the processor device, belong to the processor device, are controlled by the processor device or control the processor device - being arranged inside or outside of the processor device PE, such as a digital signal processor or further memory devices, the basic function of which is sufficiently well known to a person skilled in connection with a processor device for controlling a mobile telephone and which is therefore not discussed in more detail at this juncture. The different components can interchange data with the processor CPU via a bus system BUS or input/output interfaces and possibly suitable controllers.

The memory device SPE stores the program data, such as the control instructions or control procedures etc., which are used for controlling the mobile telephone and the operator control unit MMI, and information for describing the virtual interface panel together with graphics objects.

Figure 2 shows a virtual interface panel VOF and a smaller display panel ANF, in which a detail from the virtual interface panel VOF is shown. Graphics objects GO arranged on the virtual interface panel VOF are projected onto the edge of the display panel ANF along the lines shown, the graphics objects PGO projected in this manner being shown there as lines. To clarify, the display panel ANF is shown once again in enlarged form on the right. In line with one variant embodiment of the invention, the user can move the display panel ANF over the

virtual interface panel VOF or can move the virtual interface panel VOF under the display panel ANF by operating a navigation key. In addition, a change in the scale of representation or zoom factor, which relates to the virtual interface panel VOF, particularly to the portion of the virtual interface panel VOF which is shown by the display panel ANF.

Figure 3 corresponds to figure 2 with the exception that in this case the projected graphics objects PGO are shown not as lines but rather in reduced and halved form.

Figure 4 is used to explain the following method for calculating projection edges for the case of a rectangular display panel:

```
If Abs (oX / oY) > dsp.Width / dsp.Height Then
     'right and left
        pY = oY / oX * dsp.Width / 2
        If oX > 0 Then
        'right
          pX = dsp.Width / 2
        Else
        'left
          pX = -dsp.Width / 2
          pY = -pY
        End If
        disP = Sqr(pX * pX + pY * pY)
        rP = rO / disO * disP
        s(i).Width = 30
        s(i).Height = 2 * rP
     Else
     'top and bottom
        pX = oX / oY * dsp.Height / 2
        If oY > 0 Then
        'bottom
          pY = dsp.Height / 2
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        Else
        'top
          pY = -dsp.Height / 2
          pX = -pX
        End If
        disP = Sqr(pX * pX + pY * pY)
        rP = rO / disO * disP
        s(i).Width = 2 * rP
        s(i).Height = 30
     End If
```

Figure 5 is used to explain the following method for calculating projection edges for the case of a round display panel:

```
dc = dsp.Width / 2
        f = oX / oY
        cY = dc / Sqr(f * f + 1)
        cX = f * cY
        If (oX > 0 And cX < 0) Or (oX < And cX > 0) Then
cX = -cX
        If (oY > 0 And cY < 0) Or (oY < 0 And cY > 0) Then
cY = -cY
        rC = rO / oX * cX
        s(i).Width = 2 * rC
        s(i).Height = 2 * rC
```

Figures 6 to 9 show different representation variants for the projected graphics objects PGO:

In figure 6, the graphics object is simply halved in the center and, following appropriate reduction, is shown in projection on the edge.

In figure 7, the graphics object is first halved and reduced in line with the procedure described in figure 6, and then additionally - if it exceeds the threshold with the

length l
- the half-image is distorted again onto the threshold (just) in the horizontal direction if a left or right projection depiction was previously involved, otherwise the half-image is additionally distorted onto the threshold (just) in the vertical direction.

Figure 8 shows the graphics object, in line with the halved area described in figure 6, not in half but rather in full thereon. To achieve this, following the operation in figure 6, it is distorted by the factor 0.5 and is shown in full view in projection flush to the edge.

In figure 9, the graphics object is distorted in hybrid form as described under 7 and 8: first, the graphics object is projected in the horizontal or vertical direction in full on the edge in line with the halved area and distortion described in figure 8. In addition, if the threshold l is exceeded, as described in figure 7, the graphics object is reduced to the length l only in the horizontal or vertical direction and is shown flush to the edge.

In addition to the variant embodiments of the invention which have been explained above, a large number of further variant embodiments are within the scope of the invention, these not being described further here but being able to be easily implemented in practice using the exemplary embodiments explained.